

**Great Smoky Mountains National Park**  
**photographs of**  
***Quercus rubra* / (*Vaccinium simulatum*, *Rhododendron*  
*calendulaceum*) / (*Dennstaedtia punctilobula*, *Thelypteris*  
*noveboracensis*) Forest**



***Quercus rubra* / (*Vaccinium simulatum*, *Rhododendron calendulaceum*) /  
(*Dennstaedtia punctilobula*, *Thelypteris noveboracensis*) Forest**

***Quercus rubra* / (*Vaccinium simulatum*, *Rhododendron calendulaceum*) / (*Dennstaedtia punctilobula*, *Thelypteris noveboracensis*) Forest**

COMMON NAME Red Oak / (Mountain Highbush Blueberry, Flame Azalea) / (Hay-scented Fern, New York Fern) Forest  
SYNONYM High Elevation Red Oak Forest (Deciduous Shrub Type)  
PHYSIOGNOMIC CLASS Forest (I)  
PHYSIOGNOMIC SUBCLASS Deciduous forest (I.B)  
PHYSIOGNOMIC GROUP Cold-deciduous forest (I.B.2)  
PHYSIOGNOMIC SUBGROUP Natural/Semi-natural (I.B.2.N)  
FORMATION Lowland or submontane cold-deciduous forest (I.B.2.N.a)

ALLIANCE *Quercus rubra* Montane Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

**Globally**

This community occurs on most of the major mountain ranges of the southern Appalachians in North Carolina, Tennessee, and Georgia. It may possibly range into Kentucky's Cumberland Mountains and into Virginia and West Virginia.

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This community was sampled on the Cades Cove quadrangle and was not found on the Mount Le Conte quadrangle. Historic samples are from the Cades Cove quadrangle and the Thunderhead Mountain quadrangle, but the community is likely in other areas of the Park. On the Cades Cove quadrangle, recent and historic samples representing this community come from elevations ranging from just over 4000 feet to 5000 feet, in the southern portion of the quadrangle. This community was sampled from the summits and convex high slopes Gregory Ridge; the southwest slopes below Gregory Bald; the southeastern high slopes below Moore Spring Camp; the western summit of Pond Knob; and the convex west slopes of Molliess Ridge.

ENVIRONMENTAL DESCRIPTION

**Globally**

This community occurs at elevations of 1070-1525 m (3500-5000 feet) on broad ridges and mid to upper slope positions. DeLapp (1978) found that this community occurs on most slope aspects but was most commonly found on southeast and south exposures. This community occurs over well-drained soils underlain by Precambrian gneisses, schists, and granites. These soils are classified as Typic, Umbric, or Lithic Dystrochrepts, and Typic Haplumbrepts (Golden 1974). Soils supporting this forest with a mainly deciduous shrub understory are slightly less acidic than *Quercus rubra*-dominated forests with evergreen shrub understories (DeLapp 1978). Occurrences of this community on exposed slopes and south- and west-facing ridges are subject to lightning-caused fires and damage by ice and wind. Damage by ice storms is probably the most common form of natural disturbance.

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This community was sampled at elevations from 4000 to 5000 feet, on high slopes, ridges, and summits with northern to southwestern aspects. Most examples showed evidence of disturbance by wind, ice, and Chestnut Blight.

MOST ABUNDANT SPECIES

**Globally**

Stratum

Tree canopy

Subcanopy

Tall shrub

Short shrub

Herbaceous

Species

*Quercus rubra*

*Acer rubrum*, *Ilex montana*, *Hamamelis virginiana*

*Rhododendron calendulaceum*, *Vaccinium simulatum*

*Vaccinium erythrocarpum*, *Vaccinium pallidum*, *Rubus canadensis*

*Dennstaedtia punctilobula*, *Thelypteris noveboracensis*, *Ageratina altissima* var. *roanensis*

**Great Smoky Mountains National Park**

Stratum

Tree canopy

Subcanopy

Species

*Quercus rubra*

*Acer rubrum*, *Amelanchier laevis*

Tall shrub *Ilex montana*, *Rhododendron calendulaceum*, *Castanea dentata*, *Vaccinium corymbosum*  
Herbaceous *Dennstaedtia punctilobula*, *Thelypteris noveboracensis*

#### CHARACTERISTIC SPECIES

##### **Globally**

*Quercus rubra*, *Ilex montana*, *Hamamelis virginiana*, *Rhododendron calendulaceum*, *Vaccinium erythrocarpum*, *Dennstaedtia punctilobula*, *Thelypteris noveboracensis*, *Ageratina altissima* var. *roanensis*, *Carex pensylvanica*

##### **Great Smoky Mountains National Park**

See above

#### VEGETATION DESCRIPTION

##### **Globally**

This forest is dominated by *Quercus rubra* with other species making up less than 25 percent of the canopy cover. Other canopy and subcanopy trees may include *Acer rubrum*, *Betula alleghaniensis*, *Betula lenta*, *Castanea dentata* (root sprouts), *Hamamelis virginiana*, *Fagus grandifolia*, *Ilex montana*, *Acer pensylvanicum*, *Halesia tetraptera*, and on more exposed sites, *Quercus prinus*. At higher elevations, this community may contain *Picea rubens*. The shrub layer may be continuous to patchy but has at least 20 percent cover and more than 50 percent of the total shrub cover is deciduous, although evergreen shrubs may be present. Typical shrub dominants include *Rhododendron calendulaceum*, *Vaccinium simulatum*, *Vaccinium erythrocarpum*, *Ilex montana*, *Gaylussacia ursina*, *Rubus canadensis*, *Corylus cornuta*, and *Lyonia ligustrina*. Other shrubs occur with low frequency and may include *Kalmia latifolia*, *Rhododendron catawbiense*, *Rhododendron maximum*. *Rubus allegheniensis* occurs in disturbed openings and in seeps. The herbaceous stratum is diverse and is predominantly a mix of sedges, ferns, and tall herbs. Herbaceous dominance varies within and between occurrences. Typical herbaceous species include *Ageratina altissima* var. *roanensis*, *Aster divaricatus*, *Aster acuminatus*, *Athyrium filix-femina* ssp. *asplenioides*, *Clintonia umbellulata*, *Collinsonia canadensis*, *Conopholis americana*, *Dennstaedtia punctilobula*, *Dioscorea villosa*, *Laportea canadensis*, *Lysimachia quadrifolia*, *Medeola virginiana*, *Monarda fistulosa*, *Potentilla canadensis*, *Prenanthes roanensis*, *Silene stellata*, *Solidago caesia* var. *curtisii*, and *Thelypteris noveboracensis*.

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The canopy of this forest is strongly dominated by *Quercus rubra*, often gnarled and stunted, particularly on sites affected by wind and ice. Other minor canopy trees include *Quercus alba* and *Acer rubrum*. The subcanopy can be absent or have moderate coverage and commonly includes *Acer rubrum* and *Amelanchier laevis*. The shrub strata are moderate to dense and dominated by deciduous species, commonly *Ilex montana*, *Rhododendron calendulaceum*, *Castanea dentata*, *Rubus canadensis*, *Vaccinium erythrocarpum*, and *Vaccinium corymbosum*. The well-developed herbaceous stratum is quite diverse and can approach 100 percent coverage. Fern species (*Dennstaedtia punctilobula*, *Thelypteris noveboracensis*) are often dominant, but many other species can occur. Some of the other herbaceous species found in this forest include *Ageratina altissima* var. *roanensis*, *Agrostis perennans*, *Agrostis stolonifera*, *Aster divaricatus*, *Aster macrophyllus*, *Carex pensylvanica*, *Clintonia umbellulata*, *Collinsonia canadensis*, *Dichantheium* spp., *Dioscorea quaternata*, *Eupatorium maculatum*, *Galium latifolium*, *Gentianella quinquefolia* ssp. *quinquefolia*, *Hieracium paniculatum*, *Houstonia purpurea* var. *purpurea*, *Houstonia serpyllifolia*, *Lysimachia quadrifolia*, *Maianthemum racemosum*, *Medeola virginiana*, *Monarda clinopodia*, *Prenanthes* spp., *Silene stellata*, *Smilax herbacea*, *Solidago caesia* var. *curtisii*, and *Stenanthium gramineum*.

#### OTHER NOTEWORTHY SPECIES

Animals that use this community include Red Squirrel (*Tamiasciurus hudsonicus*) and Eastern Chipmunk (*Tamias striatus*). Many species in this community are endemic to the southern Blue Ridge or have the bulk of their worldwide range in that region. Some of these endemics include *Abies fraseri*, *Aesculus flava*, *Ageratina altissima* var. *roanensis*, *Carex roanensis*, *Clethra acuminata*, *Euphorbia purpurea*, *Leucothoe recurva*, *Prenanthes roanensis*, *Rhododendron catawbiense*, *Rhododendron vaseyi*, *Silene ovata*, *Solidago caesia* var. *curtisii*, and *Vaccinium erythrocarpum*.

#### CONSERVATION RANK

G4

#### RANK JUSTIFICATION

This community is uncommon but not rare. It is secure within its range.

#### DATABASE CODE

CEGL007300

#### COMMENTS

##### **Globally**

Major compositional variation within this community is related to a moisture gradient, which in turn is a function of topographic position and relative amount of solar radiation received (DeLapp 1978). Occurrences on open slopes with deeper soils may have understories dominated by clones of *Corylus cornuta*. Density of the shrub layer and the importance of herbs in the understory vary among occurrences. Many *Quercus rubra*-dominated stands of today were, prior to the Chestnut Blight in the 1930s,

dominated or codominated by *Castanea dentata* with scattered *Quercus rubra* and *Acer rubrum* in the canopy (Golden 1974). The fungus *Endothia parasitica* eliminated *Castanea dentata* in the upper canopy, subsequently releasing the subcanopy *Quercus rubra*, which eventually resulted in a nearly pure upper canopy of large *Quercus rubra*. At higher elevations this forest often occurs adjacent to or grades into forests dominated by *Picea rubens*, *Abies fraseri*, or northern hardwood species (*Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*). In some areas, this community is found adjacent to montane shrublands and grasslands. At low elevations on dry sites, this community may grade into forests dominated by mixed *Quercus* species.

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Particularly along the Tennessee / North Carolina state line on the Cades Cove quadrangle, *Quercus rubra* and *Quercus alba* dominance intergrades and may make delineation of this type difficult. Lower elevation occurrences (below 4500 feet elevation) begin to resemble Typic Acidic Montane Oak – Hickory Forest (*Quercus alba* - *Quercus (rubra, prinus)* / *Rhododendron calendulaceum* - *Kalmia latifolia* - (*Gaylussacia ursina*) Forest, CEG007230) in composition, with an increase in coverage of species such as *Acer rubrum*, *Quercus alba*, *Cornus florida*, *Magnolia fraseri*, *Oxydendrum arboreum*, *Robinia pseudoacacia*, *Carya* spp., *Gaylussacia ursina*, and *Vaccinium hirsutum*, and the presence of herbs more indicative of lower elevation forests. It is unlikely that the signature of this community can be distinguished from other forests in the *Quercus rubra* Montane Forest Alliance.

REFERENCES

Braun 1940, Braun 1950, DeLapp 1978, Evans 1991, Evans pers. comm., Golden 1974, Rawinski 1992, Schafale and Weakley 1990, Stephenson and Adams 1989, Whigham 1969, Whittaker 1956